REMARKS/ARGUMENTS

A Request for Continued Examination is filed herewith.

The foregoing amendment is presented to advance the prosecution of the application.

A request for a three month extension of time is filed herewith; the fee for a one month extension of time was previously filed on September 27, 2006.

Claims 2 and 5 have been amended to better define the respective products in order to distinguish from the references of record. Claim 2 now specifies that the process by which the carbon black pellet is produced consists essentially of the recited step of feeding the pelletized carbon black and water as defined. Claim 5 has been similarly amended to thereby exclude a multi-step process which is shown in the prior art.

Claim 2 additionally specifies the pellet fraction of 0.71 – 1.0 mm as being greater than 25 wt% as disclosed on page 5, line 10.

Claim 5 additionally has been amended to call for a binder as shown on page 5, line 2.

Claims 2 and 5 have been further amended to address the comment in the Advisory Action of October 24, 2006 that "...transport properties are not claimed". Both claims now specify the transport characteristics in terms of the fines content. This is discussed on pages 14-16 of the application.

In Figures 6-8, the thin stream transport at 7 kg/kg results in a fines fraction of 15 wt. % and 20 wt. %. The comparison carbon black (Figure 7) results at a lower solid/air ratio of 6 kg/kg in a higher fines fraction of over 20 wt. %.

In Figure 10, the thin stream transport at 14 kg/kg results in a fines fraction of 7 wt. % compared with Figure 9 (comparison example) which results at a lower solid/air ratio of 11 kg/kg in a higher fines fraction of 15 wt. %.

No new matter is presented.

The rejection of Claims 2-4, 8, 10, 18 and 20 under 35 U.S.C. § 103(a) in view of *Klasen, et al.*, US 5,480,626, (*Klasen*) in view of *Bush*, US 5,236,992, (*Bush*) is traversed and reconsideration is respectfully requested.

The present invention is directed towards the problem of improving flow and storage properties of carbon black pellets while at the same time retaining sufficient dispersability to permit good dispersions. Thus, the present invention seeks to achieve a balancing of hardness and softness in carbon black pellets. See, [0010], page 2. Applicants have found that carbon pellets produced in accordance with the process recited in the claims have unexpectedly good properties to overcome at least some of the problems observed in the past.

There are two ways of pneumatic conveying of beaded goods: dense flow and thin-stream transport. The methods differ in the amount solid-air transport ratio and in speed of transport air. Depending on the equipment either one or the other method is used. Nowadays there is a trend towards dense flow transportation because the transported goods are less destroyed. The goal is to achieve a high transport capacity at a low air speed. A low speed is important because otherwise the granulates/beads get destroyed resulting in powder. This is difficult to weigh or to mix in rubber (needing longer times; giving bad dispersion). See the results of dense flow tests, page 13, and thin stream tests on page 14.

The cited references do not teach or suggest the subject matter defined by the rejected claims.

Klasen claims a multi-step process using a ring collar mill resulting in granulated solids having a "very narrow particle size distribution and are distinguished by good flowability and good dispersability…".

It is at least a three step process: a powder is mixed in a mixer with moisture, binders, etc., then compressed in a ring collar mill and rounded in an extra step. In the present application, a process using a ring layer mixing granulator producing the desired beads (pellets) in one step is described. This improved process is now pointed out by virtue of the fact that the claims now recite that the process consists essentially of the recited step. The claim language therefore excludes the multi-step process of the prior art because the multi-step process of the prior art have several essential steps.

In his abstract, *Klasen* describes his invention as:

> A method for the production of spherical granulated materials from powdered solids and the granulated materials produced by it are disclosed. The method is characterized in that the powdered solids are moistened, possibly together with the usual binders, flow agents and plasticizers for the compression of solids, by the addition of a corresponding quantity of liquid and mixing smoothly in a mixer; they are then compressed with a ring collar mill into cylindrical agglomerate and then rounded in a rounding unit with wrinkle washer. The granulated solids thus produced have a very narrow particle size distribution and are distinguished by good flowability and good dispersability, depending on process controls.

Klasen is entirely silent with respect to the process conditions recited in Claim 2; namely, keeping the feed amount of the unpelletized carbon black constant, dispersing water into the granulator by two nozzle holders, the nozzle configuration with respect to the flow of carbon black and pressure condition.

Further, *Klasen* does not teach the limitations regarding pellet fractions recited in Claim 2. Claim 2 specifies a pellet fraction of 0.71-1mm greater than 25 wt.%. *Klasen*'s fraction of 0.71-1 mn can be calculated as 3-22 wt.%. See attached calculations of Dr. Schuck, coinventor herein.

The Office Action alleges that it would have been obvious to use the carbon black of *Bush* in the *Klasen* process. Applicants respectfully submit that the combination of references fail to create *prima facie* obviousness of the claimed invention herein.

Bush refers to the production of carbon black with certain intrinsic properties as surface area (iodine or CTAB number), structure properties (DBP, CDBP) and primary particle size distribution (tint).

These properties are called intrinsic because they are formed in the carbon black reactor as described by *Bush* (and many others) at temperatures above 1000° C. After the carbon black leaves the reactor, it is almost impossible to change these properties.

Bush found a certain combination of surface area, structure and primary particle size which offers, <u>after</u> it has been incorporated in the rubber, certain advantages.

Bush does not describe how the carbon black is treated (pelletized) after it leaves the reactor nor does he describe how it is handled (conveyed) before it is incorporated in the rubber. Additionally, he does not claim any influence on dispersion of the carbon black in the rubber.

Hence, there is no teaching of the limitations in Claim 2 whereby the desired carbon black pellets of this invention are produced.

The Official Action has not established that the process condition of *Klasen* or those of *Bush* are so similar to the process conditions recited in Claim 2 so as to create a presumption that the resulting carbon black pellets of *Klasen* or *Bush* would be the same or similar to applicants' carbon black pellet defined in Claim 2.

It is to be noted that the Official action does not point out any section of the *Bush* reference as containing a teaching, reason or suggestion that there would be some benefit or advantage in replacing the carbon black of *Klasen* with the carbon black of *Bush*. Absent some suggestion in the reference, there is no motivation for the person skilled in the art to make such a substitution.

Neither of the two references point out the property parameters recited in the claims; namely, oil absorption numbers and pellet fraction data. Thus, a person skilled in the art would find no guidelines in the combination of references enabling one to arrive at those parameters.

Faced with the problem of balancing hardness with good dispersability, one skilled in the art would not find anything in either or both cited references which would suggest that there would be an advantage or benefit to producing the carbon black pellets as defined herein. The improvement in conveying the resulting carbon black pellets could not have been predicted from a consideration of *Klasen* and *Bush*.

Figures 2 to 10 containing the graphs display the results of a testing program in which the limits of stable conveying conditions were evaluated. Air velocity, solids-transport air ratio and resulting from that transport capacity were varied as test parameters.

The time intervals in the graphs show absolute time; e.g., 10:58 am (format h:m). The interval between the vertical lines normally represents 1 or 2 minutes. The graphs display about 6 minutes total time for the transport trials.

The left axis of the graphs displays weight carbon black transported and the right axis of the graphs contains values for transport pressure.

The goal in every pneumatic transport system is a high transport capacity.

Carbon black no. 2 of the invention achieves a transport capacity of 4.6 t/h, whereas comparison carbon black no. 1 achieves only 3.8 t/h. Figure 2 shows that at a constant pressure plateau, carbon black no. 2 can be transported without problems under this condition.

Figure 3 shows the behavior of comparison carbon black no. 1. Even though the conditions are less severe than in Figure 2; that is, a reduced solid-air transport ratio for comparison carbon black no. 1, the pressure profile is less constant.

This means that for comparison carbon black no. 1, at higher solid-air transport ratios, the system would get more and more unstable, resulting in plugging of the reactor tubes, which is the worst case in pneumatic conveying, because plugging can only be removed by mechanically opening the carbon black clogged tubes.

Uneven pressure occurs if not all of the transported carbon black is kept moving all the time. Then carbon black accumulates somewhere in the system, thus reducing the open space in the tube. The pressure increases until the accumulation is blown away. After that, the pressure decreases, again and the cycle repeats itself. Thus, such pressure fluctuations can be see in Figure 3.

However, at certain conditions (e.g., too high solid-air transport ratio), the accumulation increases faster than the pressure, resulting in plugging of the tubes.

In the case of dense flow transport a comparison shows that the carbon black pellets 2 in accordance with the invention (Figure 4) form a plateau of pressure in the pressure-time diagram at an air velocity of 4.8 m/sec even with an elevated solids/air ratio in comparison with the comparison carbon black pellets 1 (Figure 5), and therefore produce stable transport conditions.

Thin stream indicates transportation at lower solids/air ratios and higher air speeds than dense flow (compare values from e.g. Figures 2 and 6).

Comparison carbon black no. 1 can be transported at the displayed conditions in a stable manner, because a stable pressure profile is achieved (Figure 7).

Transportation of carbon black 2 (Figure 6) is slightly more unstable (rougher plateau) than comparison carbon black no. 1. This is due to the more severe conditions; i.e., higher air-solids ratio, lower air speed, but still resulting in higher transport capacity.

Additionally, the properties (fines content) after the transportation are better, even though carbon black no. 2 is originally softer (lower individual pellet hardness) than comparison carbon black no. 1.

This individual pellet hardness is displayed in table 2, page 11.

Figure 8 displays carbon black no. 3 in accordance with the invention. The pressure plateau is slightly rougher than comparison carbon black no. 1 in Figure 7. However, conditions are more severe in Figure 8 than in Figure 7 resulting in a higher transport capacity and still better (lower) fines content after transportation. Additionally, this is achieved with a carbon black that is much softer (lower ind. pellet hardness) than comparison carbon black no 1.

The carbon black pellets 3 in accordance with the invention, in contrast to the comparison carbon black pellets 1, have a narrower pellet distribution with very low individual pellet hardness, which is advantageous for dispersion. In spite of the clearly different individual pellet hardnesses the carbon black pellets 3 in accordance with the invention (Figure 8) after thin-stream transport, even at a higher solids/air ratio and thus higher transport amount, show a fines fraction of 20 wt%, while the comparison pellets 1 (Figure 7), with a fines fraction of 21 wt%, have a clearly higher value, while the transport capacity is reduced at the same time.

Figure 9 displays a strong pressure increase in the system caused by carbon black accumulation. Accumulation was partly removed, however, the danger of a total blocking of the tubes remains or is even guaranteed at more severe conditions. See discussion on page 16.

To assist the Examiner in his review, Figures 2-10 with corrected legends are set forth below.

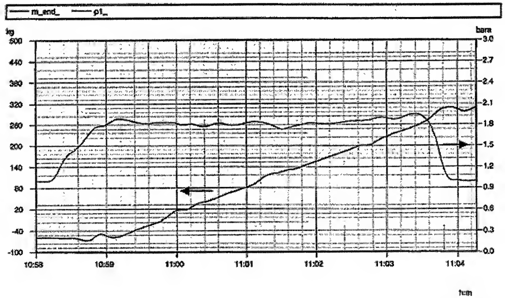


Figure 2. Course of pressure and transport amount in dense-flow transport over time for the carbon black pellets 2 in accordance with the invention with an air velocity of 5.6 m/sec, a solids-transport air ratio of 20 kg/kg and a transport capacity of 4.6 t/h.

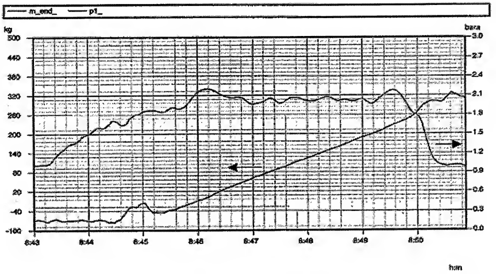


Figure 3. Course of pressure and transport amount in dense-flow transport over time for the comparison carbon black pellets 1 with an air velocity of 6.6 m/sec, a solids-transport air ratio of 14 kg/kg and a transport capacity of 3.8 t/h.

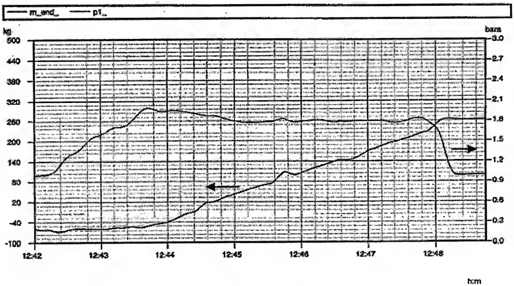


Figure 4. Course of pressure and transport amount in dense-flow transport over time for the carbon black pellets 2 in accordance with the invention with an air velocity of 4.8 m/sec, a solids-transport air ratio of 20 kg/kg and a transport capacity of 4.0 t/h.

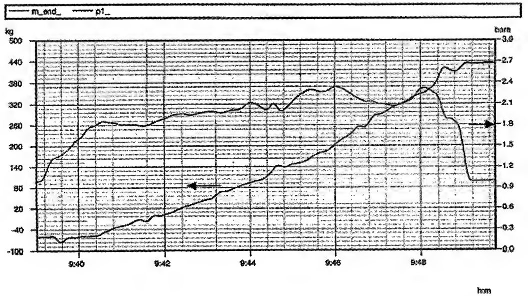


Figure 5. Course of pressure and transport amount in dense-flow transport over time for the comparison carbon black pellets 1 with an air velocity of 5.5 m/sec, a solids-transport air ratio of 18 kg/kg and a transport capacity of 4.0 t/h.

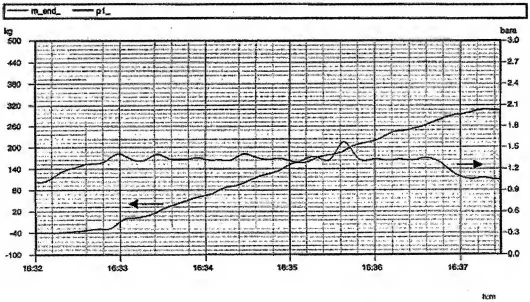


Figure 6. Course of pressure and transport amount in thin-stream transport over time for the carbon black pellets 2 in accordance with the invention with an air velocity of 15.7 m/sec, a solids-transport air ratio of 7 kg/kg and a transport capacity of 4.4 t/h.

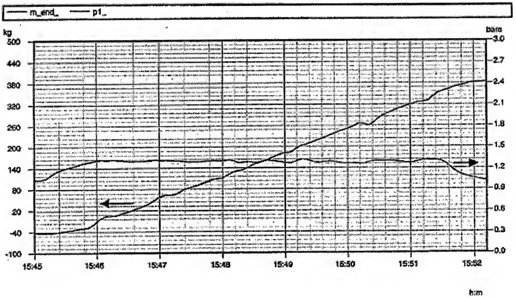


Figure 7. Course of pressure and transport amount in thin-stream transport over time for the comparison carbon black pellets 1 with an air velocity of 16.0 m/sec, a solids-transport air ratio of 6 kg/kg and a transport capacity of 3.8 t/h.

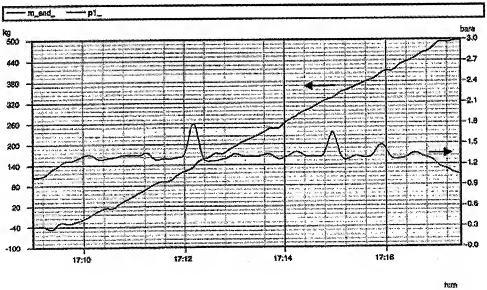


Figure 8. Course of pressure and transport amount in thin-stream transport over time for the carbon black pellets 3 in accordance with the invention with an air velocity of 15.8 m/sec, a solids-transport air ratio of 7 kg/kg and a transport capacity of 4.2 t/h.

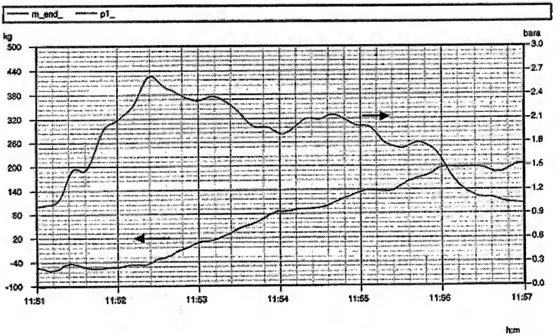


Figure 9. Course of pressure and transport amount in thin-stream transport over time for the comparison carbon black pellets 5 with an air velocity of 7.0 m/sec, a solids-transport air ratio of 11 kg/kg and a transport capacity of 3.1 t/h.

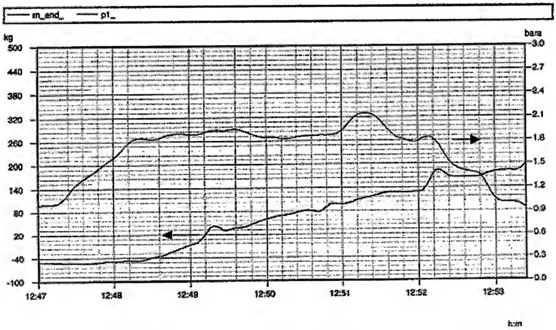


Figure 10. Course of pressure and transport amount in thin-stream transport over time for the carbon black pellets 4 in accordance with the invention with an air velocity of 5.8 m/sec, a solids-transport air ratio of 14 kg/kg and a transport capacity of 3.2 t/h.

The graphs as set forth in Figures 2-10 show an unexpected difference in behavior between the products of the invention and the comparison carbon black. From the Table 2 on page 11, it can be seen that comparison carbon black 1 is very close in physical properties to carbon blacks 2 and 3. Further, Table 2 shows that carbon black 4 of the invention is very close in physical properties to comparison carbon black 5. Therefore, the comparative data presented by applicants represents a comparison of the products of the invention to products that are closer to applicants' products than are the products of the cited prior art. Hence, assuming *arguendo* that the references establish *prima facie* obviousness, the data of record is respectfully submitted to rebut the references.

Applicants respectfully submit that the references do not render the claimed invention *prima facie* obvious.

The rejection of Claims 5-7, 9, 11, 19 and 21 under 35 U.S.C. § 103(a) in view of *Klasen* taken with *Vogler, et al.,* US 6,231,624, (*Vogler*) is traversed and reconsideration is respectfully requested.

Klasen has already been discussed above and the remarks there apply here as well.

With respect to *Vogler*, it is first necessary to note again that *Vogler* describes a process for the dry granulation of powdered carbon black in special equipment. This is clearly different from the process of the present invention which employs water in the granulator injected in a special configuration. Nothing in *Vogler* would lead a person skilled in the art to go contrary to his teachings and use a wet process.

Secondly, and more importantly, *Vogler* quotes individual bead hardnesses of approximately 0.01 to 0.06 N (table 2-6) in comparison to applicants' process with hardnesses of

16 to 25 g (table 2: 0.157-0.245 N). This difference shows clearly that the pellets achieved by *Vogler* are far softer (not "slightly" lower as alleged in the Office Action), and hence, they are supposed to be used in low viscosity applications. Therefore, pneumatic conveying is not an option from *Vogler*. In contrast, the pellets achieved in the present application are intended to be used in rubber formulations and are especially well adapted to be conveyed in a pneumatic system. The *Vogler* products and those of the present invention are clearly not the same or interchangeable. They are not even similar in there properties. Hence, a person skilled in the art would not use them in the *Klasen* process. *Vogler* already produces carbon black pellets, albeit soft ones, and so there is no reason for introducing those pellets into the *Klasen* system for producing yet more carbon black pellets. No reason, advantages or benefits are noted in the Office Action that would be likely to motivate a person skilled in the art to do so.

Vogler claims that "Wet granulated blacks generally also have a higher dispersion hardness than dry granulated carbon blacks due to their higher bead hardness. They are therefore mainly used in the rubber industry. Wet granulated carbon blacks can be efficiently dispersed in highly viscous rubber materials. Their bead hardness means that the mixture is easy to transport in pneumatic feeding units". See, col. 2, line 61, *et seq*. This quotation reflects the common opinion at the time, thus confirming the innovation of applicants' invention which shows that high bead (or pellet) hardness is not mandatory to achieve good conveying properties.

Nothing in the combination of references would enable a person skilled in the art to arrive at the product parameters defined in the claims. Further, the combination of references would not lead a person skilled in the art to expect a benefit or advantage to be obtained by selecting those product parameters.

Neither reference, nor the combination thereof, would suggest any reason for a person skilled in the art to combine the reference teachings. Nothing in *Vogler* contains any teaching, reason or suggestion that there would be some benefit or advantage if the carbon black of *Vogler* were to be used in place of the carbon black of *Klasen*. In the absence of some reason to make the substitution, there is no motivation found in *Vogler* to make such changes. Lacking the necessary motivation to combine the references, the combination proposed in the Official Action is without proper foundation and, therefore, the rejection based thereon should be withdrawn.

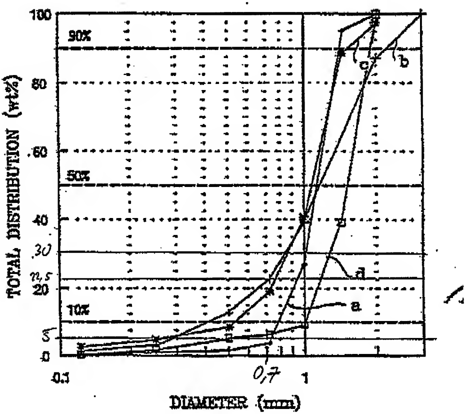
Favorable action at the Examiner's earliest convenience is respectfully requested.

Respectfully submitted,

SMITH, GAMBRELL & RUSSELL, LLP

By: [signature]
Robert G. Weilacher, Reg. No. 20,531

Date: November 20, 2006
Suite 3100, Promenade II
1230 Peachtree Street, N.E.
Atlanta, Georgia 30309-3592
Telephone: (404): 815-3593
Facsimile: (404): 685-6893



100 % ≙ 10,1 cm

=> 1 % ≙ 0,101 cm

Graph c at 1 mm : 40 %

at 0,7 mm : 19 %

=> fraction 0,7 m - 1,0 mm = 21 %

Graph b at 1 mm : 40 %

at 0,7 mm : 22,5 %

=> Fraction 0,7 - 1,0 mm = 17,5 %

Graph a at 0,7 mm : 4 %
at 1 mm : 26 %

=> Fraction 0,7 - 1,0 mm : 22 %

Graph d at 0,7 mm : 6 %
at 1 mm : 9 %

=> Fraction 0,7 - 1,0 mm : 3 %

B. Schunk

Marl, 2.8.06